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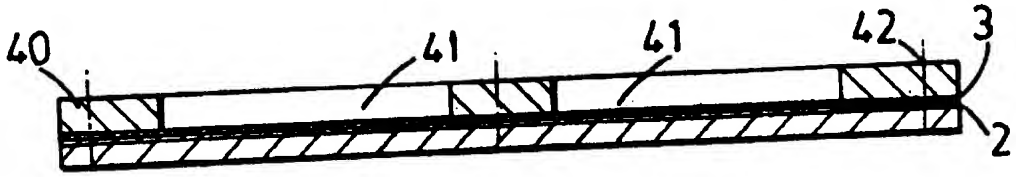

(57) Abstract

A labelling device (1) for laundry items, the labelling device comprising transponder means (3) completely encapsulated within a resin system (4, 5) which has been solidified *in situ* around the transponder means, and a thermoadhesive layer (7) for use in bonding the device to a laundry item to be labelled.

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LABELLING LAUNDRY ITEMS

The present invention relates to the labelling of laundry items to permit the identification thereof.

Laundered items are commonly labelled either by a temporary mark which is applied to the item when it is checked into the laundry, and removed when the items are checked out after processing, or by a permanent label, which relates to the customer and the wearer. In this invention we are concerned with the permanent labelling of laundry items. A prior art permanent label which enables automatic reading and computerised data storage employs bar-coding. Such a label bears a unique bar-code which is scanned into a computerised database management system which stores all necessary information relating to the item being laundered. A drawback of bar-coding is that the bar-coded label must be located manually so that it can be presented to the scanner for reading. In a bundle of soiled garments and linen, this can present a problem.

Transponder devices have previously been proposed for laundry identification.

A transponder is an electronic device providing an identification code for the laundry item which can be "read" using a transceiver radio device. The transponder provides a unique signal for the garment to which it is attached, the signal being decoded by the radio device for the purposes of identifying the garment.

The device, when attached to a laundry item, is used in conjunction with non-contact scanning systems which enable the garments to be scanned and individually

identified. Such scanning systems may be linked to a computerised database management system which enables the garments to be tracked through the laundry and throughout their life.

The use of a transponder overcomes the disadvantages of bar coding, while retaining the advantages. In addition a transponder device can be used for automatic routing of the items through the laundry, without there being any need for human contact in presenting the device to the reader.

The prior art proposals for using transponder devices for labelling laundry items have involved providing the device in a button in the form of a shell which comprises two parts glued together. The button was then stitched onto the laundry item. A limitation of this method is that such devices are lost when thread stitching the button in place breaks. Also softening of the adhesive during laundering allows water penetration into the device and resultant failure. A further limitation is that the limited size restricts the range at which the device can be read.

It is therefore an object of the present invention to obviate or mitigate the above-mentioned disadvantages.

According to a first aspect of the present invention there is provided a labelling device for laundry items, the labelling device comprising transponder means completely encapsulated within a resin system which has been solidified in situ around the transponder means, and a thermoadhesive layer for use in bonding the device to a laundry item to be labelled.

According to a second aspect of the present invention there is provided a method of labelling a laundry item (e.g. a garment) comprising using heat to bond a device in accordance with the first aspect of the invention by means of its thermoadhesive layer to the item.

According to a third aspect of the invention there is provided a garment having applied thereto a labelling device in accordance with the first aspect of the invention.

In the labelling device in accordance with the invention, the transponder means is sealed within an encapsulating resin which has been solidified in situ with the transponder means. This ensures that the transponder means is completely sealed within the resin system so that ingress of water to the transponder means is not possible. In other words, the device is waterproof. The thermoadhesive layer provides a means of securely bonding the labelling device to a garment so that, in effect, the device is permanently attached thereto.

The encapsulating resin and the thermoadhesive layer are chosen so as to be substantially unaffected by laundering and dry cleaning chemicals and conditions, as well as by processes such as pressing and calendering. Thus the devices are durable to repeated laundering and cleaning operations.

The encapsulating resin and thermoadhesive layer should be selected to provide a balance of flexibility (rendering the devices inconspicuous in normal use) combined with stiffness (to prevent damage during laundering). For preference, the solid encapsulating resin has a Shore A hardness greater than 90 or a Shore D hardness of 50-70. If the Shore A hardness is less than 90 or the Shore D hardness is

less than 50 it may be found that the device flexes during the laundry process with resultant damage to the device. A shore D hardness greater than 70 may result in devices with inadequate bonding to the bonding layer so that the devices may fall off the garment during laundering.

One embodiment of the device in accordance with the invention comprises the transponder means within the encapsulating resin which is provided with a layer of a thermoadhesive film which serves to bond the device to a laundry item by heat and pressure.

In a further embodiment of the device, the encapsulating resin is laminated to a permanent carrier to facilitate handling of the device. The permanent carrier may for example comprise a textile material and is bonded on one face to the encapsulating resin and on the other face is provided with a thermoadhesive material (e.g. a thermoadhesive film) for bonding the device to a garment.

Devices in accordance with the invention may be produced by applying a layer of the encapsulating resin system (in liquid form) to the means providing the bonding layer (e.g. a thermoplastic film or permanent carrier as discussed above), locating the transponder means partially in the encapsulating resin and then applying further liquid encapsulating resin so as completely to enclose the transponder means. The encapsulating resin is then solidified.

Preferably the encapsulating resin is a cross-linking resin system and the bonding layer is a thermoplastic material, preferably a thermoplastic film.

The thermoplastic film preferably has a thickness in the range of 100 to 200 microns, e.g. about 125 microns.

The cross-linked resin system is preferably a cross-linked polyurethane resin system produced by reacting a polyurethane resin with a di- or higher- functionality isocyanate. The preferred polyurethane is a polyether polyurethane and the preferred isocyanate is an aryl di- isocyanate, preferably a diphenyl di-isocyanate, and most preferably 4', 4"-diphenylmethane di-isocyanate (MDI). Further examples of suitable di-isocyanates are disclosed in U.K. Patent No. 1 586 511 (Polymark).

Suitable polyurethane resins are available under the name "Hyperlast" (RTM, a two component polyol/isocyanate polyurethane elastomer supplied by Kemira Polymers) and "Desmophen" polyurethane resins which is used with "Desmodur" isocyanate resins. Desmophen and Desmodur (RTM are available from Whitefield Chemicals Ltd).

A suitable thermoplastic film may for example be of a polyesterurethane or a polyetherurethane.

Preferably the transponder means comprises a transponder circuit and an antenna which are arranged generally in a plane so that the transponder means is less than 1.5 mm in thickness.

Preferably a device in accordance with the present invention has an overall thickness of less than 3.5 mm and a size less than 40 mm in any other dimension.

Devices greater than about 40 mm in size are likely to suffer damage during laundering due to increased flexing. Devices greater than about 3.5 mm in thickness

are more obtrusive in wear and being stiffer were more likely to be torn off during laundering.

Preferably the device is such that it can be printed on an outer surface with a durable ink giving human readable information.

The invention will be further described by way of example only with reference to the accompanying drawings, in which:

Fig. 1 is a plan view of one embodiment of device in accordance with the present invention;

Fig. 2 is a sectional view of the device of Fig. 1.

Fig. 3 is a cross-sectional view of a further embodiment of a device in accordance with the present invention; and

Figs 4a and 4b illustrate a jig arrangement for producing devices in accordance with the invention.

The drawings are to double scale (i.e. the device is shown as twice actual size).

Referring firstly to Fig. 1 and 2, the illustrated device 1 is supported on a temporary release carrier 2 (e.g. of siliconised paper or the like) and comprises a transponder means 3 encapsulated within a resin system depicted generally as 4. More specifically, the resin system 4 comprises separately laid down portions 5 and 6 of a cross-linked resin system (e.g. a cross-linked polyurethane) and a facing layer 7 of a thermoplastic film. The portions 5 and 6 are shown separately to depict that, the liquid cross-linking resin is laid down in two steps but it will be appreciated that the portions 5 and 6 cure to produce a single block of resin.

The transponder means 3 comprises a transponder circuit 8 and an aerial loop 9 (see also Fig. 2) arranged generally in plane so that the transponder means has an overall thickness of less than about 1.5 mm.

In order to apply the device of Fig. 1, the temporary carrier 2 is removed and the device is applied using heat and pressure so as to cause the film 7 to bond the device to a garment.

A number of modifications may be made to the device illustrated in Fig. 1. Thus, the temporary carrier 2 may be omitted. Alternatively, the film 7 may be omitted during the encapsulation process and may be heat bonded to the device after the temporary carrier is removed and prior to application of the devices to the items laundered.

The device illustrated in Fig. 3 is similar to that of Fig. 1 and like reference numerals in the drawings designates like parts. In the device of Fig. 3, the cross-linked layer 5 is bonded to a fabric 10 which is provided on its face opposite the resin 5 with a film 11 of a thermoplastic resin which has been pre-bonded to the fabric 10.

Fig. 4a is a sectional view of a jig for use in producing a device of the type illustrated in Fig. 1. Fig. 4b is a plan view of Fig. 4a.

The illustrated jig comprises a steel block 40 having apertures 41 each defining a mould cavity. The block is held in place by screws 42. A plurality of such blocks maybe provided in a single jig assembly. As shown in Fig. 4a, the block 40 is located on an assembly of a release paper 2 and a thermoplastic film 3. To produce the device of the invention, a first layer of a cross-linkable resin system is introduced

into the base of the mould cavity and the transponder means 3 is then located in position on this resin layer prior to the addition of further cross-linking resin to ensure complete encapsulation of the transponder means. The cross-linking resin is then cured.

The following non-limiting Example illustrates the invention.

Example

A jig of the type illustrated in Figs. 4a and 4b was coated with a release compound and a piece of the Tuftane 310 (RTM: polyester urethane film obtained from Lord Corporation) was placed on the lower section of the jig. The upper section (including the mould block) was located in position on the lower section by screws.

The jig was preheated to 50°C as were the containers holding the cross-linkable resin system described below. This pre-heating reduces viscosity and aids wetting.

16 parts by weight Hyperlast 2874/213 were mixed with 10 parts by weight Hyoperlast 2875/046. About 2 ml of the mixture was placed in each section of the mould and allowed to spread out and cure for 10 minutes. Transponder devices of the type illustrated in Figs. 2 and 3 were then pressed into the resin in the individual sections of the mould and a further 2 ml of the resin added to each section, ensuring complete encapsulation of the transponder. The mould was then placed in a vacuum oven at 50°C for 30 minutes for the mixture to cure sufficiently for demoulding. The individual devices were then left overnight to allow full cure. The Shore D hardness was found to be 60. Surplus Tuftane film was trimmed off.

The devices were inspected for visible defects and the edges were smoothed. The devices were then bonded to cotton and polyester/cotton overalls using a heated press for reading the laundry tests.

A transceiver device was used to verify that the transponder device could be read at a distance of greater than 10 cm, without the encapsulated transponder being visible to the operator.

Laundry tests were carried out in a domestic automatic washing machine running at 90°C and using alkaline detergent blends as used in commercial laundries. During 50 wash and dry cycles the devices were tested for transceiver reading and for evidence of failure in the wash by detachment, cracking, folding, water penetration, etc.

The devices stood the 50 washes without such failure and could still be read by the transceiver device at a distance greater than 10 cm.

CLAIMS

1. A labelling device for laundry items, the labelling device comprising transponder means completely encapsulated within a resin system which has been solidified in situ around the transponder means, and a thermoadhesive layer for use in bonding the device to a laundry item to be labelled.

2. A device as claimed in claim 1 wherein the solid encapsulating resin has a Shore D hardness of 50-70.

3. A device as claimed in claim 1 or 2 wherein the encapsulating resin is a cross-linked resin system.

4. A device as claimed in claim 3 wherein the encapsulating resin is a cross-linked polyurethane resin system.

5. A device as claimed in claim 4 wherein the resin system is a cross-linked polyether polyurethane.

6. A device as claimed in claim 4 or 5 wherein the polyurethane resin has been cross-linked with an aryl diisocyanate.

7. A device as claimed in any one of claims 1 to 6 wherein the thermoadhesive layer is provided by a thermoplastic film.

8. A device as claimed in claim 7 wherein the thermoplastic film has a thickness in the range of 100 to 200 microns.

9. A device as claimed in claim 7 or 8 wherein the thermoplastic film is a polyesterurethane or a polyetherurethane.

10. A device as claimed in any one of claims 1 to 9 wherein the thermoadhesive layer is bonded directly to the encapsulating resin.

11. A device as claimed in any one of claims 1 to 9 wherein the encapsulating resin is laminated to one surface of a carrier, the other surface of which is provided with the thermoadhesive layer.

12. A device as claimed in any one of claims 1 to 11 wherein the transponder means comprises a transponder circuit and an antenna which are arranged generally in a plane so that the transponder means is less than 1.5 mm in thickness.

13. A device as claimed in any one of claims 1 to 12 having an overall thickness of less than 3.5 mm and a size less than 40 mm in any other dimension.

14. A method producing a device as claimed in claim 1 comprising applying a layer of the encapsulating resin system in liquid form to the means providing the bonding layer, locating the transponder means partially in the encapsulating resin, then applying further liquid encapsulating resin so as completely to enclose the transponder means and solidifying the encapsulating resin.

15. A method of labelling a laundry item comprising using heat to bond a device as claimed in any one of claims 1 to 13 by means of its thermoadhesive layer to the item.

16. A garment having applied thereto a labelling device in accordance with any one of claims 1 to 13.

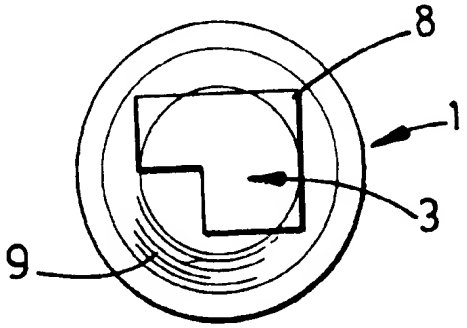

FIG.1

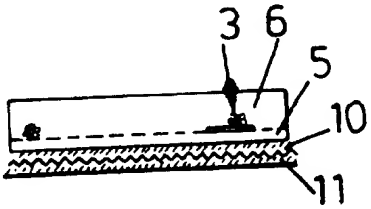

FIG.3

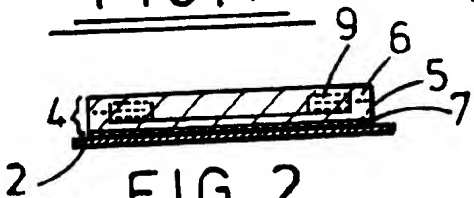

FIG.2

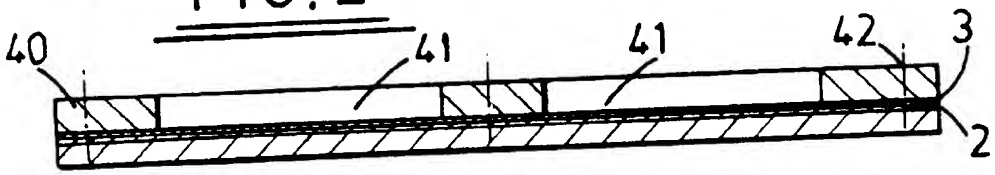

FIG.4a

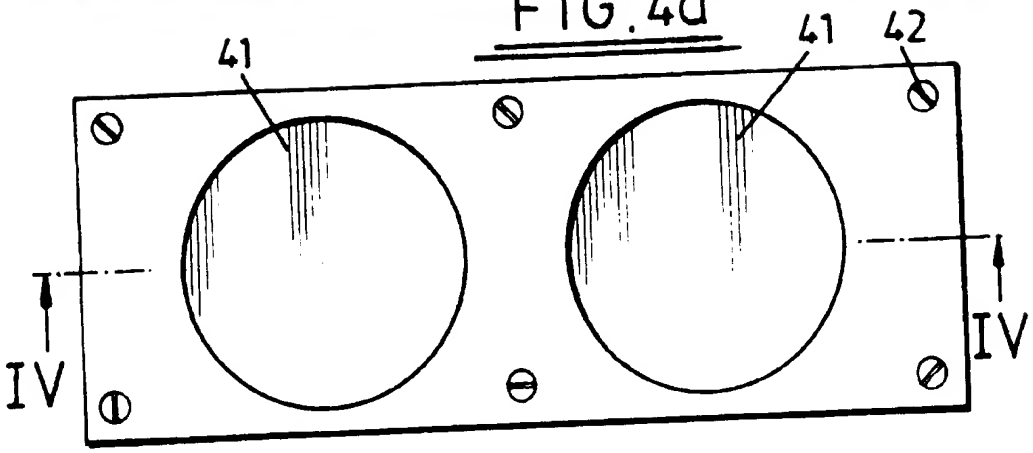

FIG.4b

INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/GB 95/02165

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 D06F93/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 D06F G09F G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	EP,A,0 620 537 (A. GUSTAFSON) 19 October 1994 see the whole document	1-16
A	US,A,4 136 778 (J. WORTMAN ET AL.) 30 January 1979 see the whole document	1-16
A	GB,A,2 073 550 (STANDARD TELEPHONES AND CABLES LIMITED) 14 October 1981 see the whole document	1-16
A	WO,A,93 04855 (J. MAHN) 18 March 1993 see the whole document	1-16
A,P	DE,A,43 09 914 (LICENTIA PATENT-VERWALTUNGS-GMBH) 29 September 1994 see the whole document	1-16

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
21 December 1995	16. 01. 96

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,P	DE,A,43 21 962 (ELECTROLUX THERMA GMBH) 12 January 1995 see the whole document	7
A	GB,A,1 586 511 (POLYMARK INTERNATIONAL LIMITED) 18 March 1981 cited in the application see the whole document	1-16
A	DE,A,19 09 196 (BEKO BETRIEBSMITTELKONTOR GMBH KG) 10 September 1970	

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INTERNATIONAL SEARCH REPORT

...formation on patent family members

Inter ...nal Application No
PCT/GB 95/02165

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP-A-620537	19-10-94	AU-B-	6429094	08-11-94
		WO-A-	9424642	27-10-94
US-A-4136778	30-01-79	NONE		
GB-A-2073560	14-10-81	NONE		
WO-A-9304855	18-03-93	AU-A-	2585792	05-04-93
		US-A-	5413841	09-05-95
DE-A-4309914	29-09-94	NONE		
DE-A-4321962	12-01-95	NONE		
GB-A-1586511	18-03-81	DE-A-	2822411	14-12-78
		FR-A,B	2391859	22-12-78
		JP-C-	1278687	29-08-85
		JP-A-	54031302	08-03-79
		JP-B-	59042636	16-10-84
		NL-A-	7805677	29-11-78
DE-A-1909196	10-09-70	NONE		